

# The Any Way Array

Grade 4

Activity #414

Relevant Chapters in the *Digi-Block Comprehensive Teacher's Guide*:  
Book III: 3-2, Combining Equal Groups of Single Blocks, pp.80-83

## Overview

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Students make arrays to model multiplication with numbers 11-25. They discover, explain, and record methods, including using known facts, for finding the product,

## Objectives

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**Thinking Skills:** Students relate their understanding of repeated addition and of basic multiplication facts to multiplication with numbers 11-25.

**Mastery Skills:** Students learn to model arrays with 2-digit numbers and to write corresponding multiplication sentences. They learn to find the total number of blocks (the product) for a given array.

## Materials

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- 1 overhead transparency of the array mat (optional)  
(Erik – We need Blackline Master 2 from Starter Booklet Level III)

Each small group of students needs:

- 1 array mat
- 1 set of "Column and Row" cards
- Approx. 400 single blocks
- Small and medium holders (available as needed)
- 2 sets of number cards (cut out from the activity sheet)
- "The Any Way Array" activity sheets (multiple copies as needed)

## Class Introduction

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(20 minutes)

Begin with a class demonstration.

Choose the "column" card for the number 13. This number will become the number of columns represented on the array mat. Have a student identify columns on the array mat and/or the overhead transparency.

Choose the "row" number card for the number 19. This number will become the number of rows on the array mat. Have a student identify rows on the array mat and/or the overhead transparency.

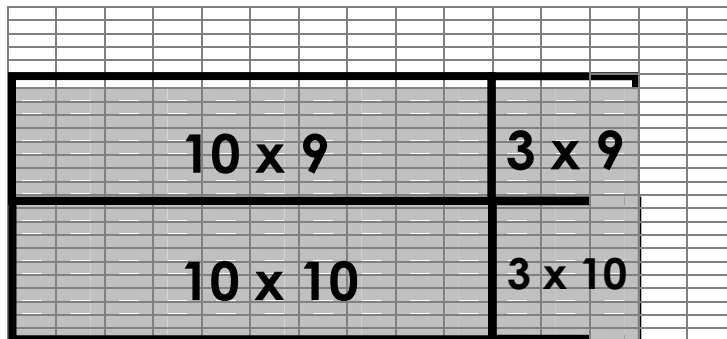
Ask students to estimate how many single blocks will be needed in order to create that number of columns and rows on the array mat.

Have students place 13 columns and 19 rows with blocks on the array mat (and color in the transparency). Ask students to identify two multiplication sentences to represent this physical model. For example:

- 13 columns with 19 rows of blocks =  $13 \times 19$  or  $19 \times 13$

Discuss methods for determining how many single blocks are on the array mat altogether. Have students lead the class through different methods. Methods may include:

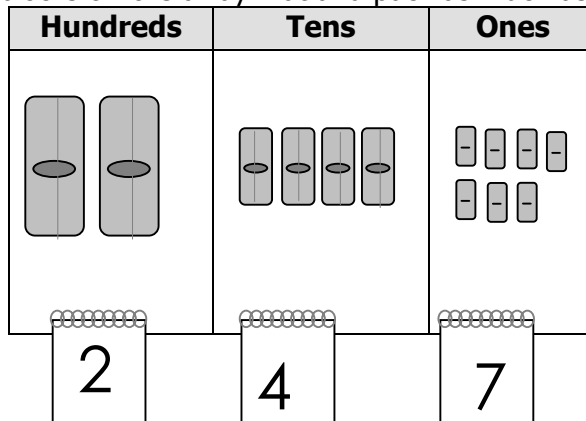
- Count the blocks one at a time: 1, 2, 3,... 247 (This method would take too long!)
- Use repeated addition for 13 groups of 19 or 19 groups of 13:
  - $19 + 19 + 19... (13 \text{ times}) = 247$
  - $13 + 13 + 13... (19 \text{ times}) = 247$
- Add 13 groups of 20 and then subtract 13 ones:
  - $20 + 20 + 20... (13 \text{ times}) - 13 = 247$
- Count by groups of ten and then add on or count the ones:
- Divide the array into smaller basic fact problems. (If students do not suggest this method, demonstrate.) For example:



$$\begin{aligned}
 10 \times 10 &= 100 \\
 3 \times 10 &= 30 \\
 10 \times 9 &= 90 \\
 3 \times 9 &= 27
 \end{aligned}$$

$$100 + 30 + 90 + 27 = 247$$

- Take the blocks off the array mat and pack as much as possible:



### Activity

(20 minutes)

Pass out the materials and activity sheets to small groups of students (2-4). Explain the activity:

- One student chooses a number from a pile of number cards (11-25) number cards) to determine the number of columns of blocks that will be placed on the array mat.
- One student chooses a number from a pile of number cards (11-15) to determine the number of rows of single blocks that will be placed on the array mat.
- Students must determine a multiplication sentence that describes their array.

- Students must determine the total number of blocks on the array mat by an agreed upon method. This method must be described on their activity sheet in as much detail as possible.

If students finish early, encourage them to check the answer using at least one other method. Then have students choose two more cards and repeat the activity using a new activity sheet.

### Closure

(10 minutes)

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Have students come together as a class to:

- Share one of their multiplication sentences. (You may want to make use the overhead transparency of the array mat to make it easier for students to demonstrate their method of finding the product.)
- Determine the accuracy of the multiplication sentences presented.

Post each group's activity sheet on a bulletin board so students can see the range of methods used to find total number of blocks in the arrays.

### Assessment

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As students are exploring, recording, and explaining, observe and note the following. Do students:

- Identify rows and columns correctly?
- Place the appropriate number of single blocks on the array mat?
- Write an accurate multiplication sentence for a given array?
- Agree upon a method for finding the total number of blocks (the product)?
- Use their method to find the total number of blocks accurately?
- Use known facts and/or repeated addition to find the total number of blocks (the product)?
- Use a second method to check the accuracy of their answer?
- Adequately show/record their method for finding the total number of blocks in the array?
- Adequately explain their method to the whole class?

### Extension

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- Encourage students to look at other groups' work and discuss their methods with each other.
- Have students think of array "situations" to accompany the multiplication sentences. For example, students might think of seats at stadium, cookies arranged on a shelf, squares on a game board, parking spaces in a parking lot, etc.
- Have students work with students who prefer alternative methods to their own. Have them explain and try each other's method.